

Study Guide

For use with pages 426–430

GOAL**Use function notation.****VOCABULARY**

When you use an equation to represent a function, it is often convenient to give the function a name, such as f or g . For instance, the function $y = x + 2$ can be written in **function notation** as follows: $f(x) = x + 2$. The symbol $f(x)$, which replaces y , is read “ f of x ” and represents the value of the function f at x .

EXAMPLE 1 Working with Function Notation

Let $f(x) = 5x - 12$. Find $f(x)$ when $x = 2$, and find x when $f(x) = 18$.

- a. $f(x) = 5x - 12$ Write function.
 $f(2) = 5(2) - 12$ Substitute 2 for x .
 $= -2$ Simplify.

Answer: When $x = 2$, $f(x) = -2$.

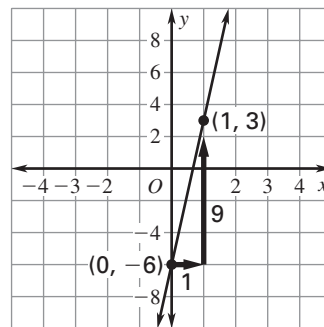
- b. $f(x) = 5x - 12$ Write function.
 $18 = 5x - 12$ Substitute 18 for $f(x)$.
 $30 = 5x$ Add 12 to each side.
 $6 = x$ Divide each side by 5.

Answer: When $f(x) = 18$, $x = 6$.

EXAMPLE 2 Graphing a Function

Graph the function $f(x) = 9x - 6$.

- Rewrite the function as $y = 9x - 6$.
- The y -intercept is -6 , so plot the point $(0, -6)$.
- The slope is 9. Starting at $(0, -6)$, plot another point by moving right 1 unit and up 9 units.
- Draw a line through the two points.

**Exercises for Examples 1 and 2**

In Exercises 1 and 2, let $f(x) = -2x + 5$. Find the indicated value.

- $f(x)$ when $x = 1$
- x when $f(x) = 39$
- Graph $f(x)$.

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EXAMPLE 3 Writing a FunctionWrite a linear function h given that $h(0) = -14$ and $h(-3) = -5$.

- (1) Find the slope m of the function's graph. From the values of $h(0)$ and $h(-3)$, you know that the graph of h passes through the points $(0, -14)$ and $(-3, -5)$. Use these points to calculate the slope.

$$m = \frac{-5 - (-14)}{-3 - 0} = \frac{9}{-3} = -3$$

- (2) Find the y -intercept b of the function's graph. The graph passes through $(0, -14)$, so $b = -14$.

- (3) Write an equation of the form $h(x) = mx + b$.

$$h(x) = -3x + (-14) = -3x - 14$$

EXAMPLE 4 Using Function Notation in Real Life

Your car needs new parts. The parts cost \$95 and the mechanic charges \$50 per hour for labor.

- Use function notation to write an equation giving the total repair cost as a function of the hours of labor.
- How long did it take the mechanic to install the new parts if the total repair cost is \$220?

Solution

- a. Let h be the hours of labor and let $c(h)$ be the total repair cost for h hours of labor. Write a verbal model. Then use the verbal model to write an equation.

Total cost	=	Cost per hour for labor	•	Hours of labor	+	Cost of parts
$c(h)$		$=$		$50h$		$+ 95$

- b. Find the value of h for which $c(h) = 220$.

$$c(h) = 50h + 95 \quad \text{Write function for total cost.}$$

$$220 = 50h + 95 \quad \text{Substitute 220 for } c(h).$$

$$2.5 = h \quad \text{Solve for } h.$$

Answer: It took the mechanic 2.5 hours to install the new parts.

Exercises for Examples 3 and 4

In Exercises 4 and 5, write a linear function that satisfies the given conditions.

4. $f(0) = 10, f(3) = 7$

5. $g(0) = -8, g(9) = -14$

6. You buy gasoline and one gallon of windshield wiper fluid at a gas station. Gasoline is \$1.50 per gallon and wiper fluid is \$1 per gallon. Use function notation to write an equation giving the total cost c for your stop at the gas station as a function of the number of gallons of gas g you buy. Then find the number of gallons of gas you buy if your total cost for gas and wiper fluid is \$13.